



Correlated income shocks and excess smoothness of consumption



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ABSTRACT

In the literature, econometricians typically assume that household income is the sum of a random walk permanent component and a transitory component, with uncorrelated permanent and transitory shocks. Using data on realized individual incomes and individual expectations of future incomes from the Survey of Italian Households' Income and Wealth, I find that permanent and transitory shocks are negatively correlated. Relaxing the assumption of no correlation between the shocks, I explore the effects of correlated income shocks on the estimated consumption insurance against permanent and transitory shocks, and consumption smoothness using a life-cycle model with self-insurance calibrated to U.S. data. Negatively correlated income shocks result in smoother consumption, and upward-biased estimates of the insurance against transitory (and permanent when borrowing constraints are not tight) income shocks. While the life-cycle model with negatively correlated shocks fits well the sensitivity of consumption to current income shocks observed in U.S. data, it falls short of explaining the sensitivity of consumption to income shocks cumulated over a longer horizon.

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1. Introduction

Since [Friedman \(1957\)](#), household income is typically modeled as the sum of a permanent random walk component and a short-lived transitory component, with no correlation between transitory and permanent income shocks. Models of household consumption over the life cycle that allow for self-insurance and liquidity constraints predict that households insure against transitory shocks almost perfectly but achieve limited insurance of permanent shocks. Using simulations of a buffer stock model of savings [Carroll \(2009\)](#) finds, for a plausible set of parameters, that (simulated) households are able to smooth only between 8 and 25% of permanent shocks to income. However, [Blundell et al. \(2008\)](#) and [Attanasio and Pavoni \(2011\)](#) recently showed, using U.S. and U.K. data, respectively, that households achieve substantial insurance against permanent income shocks. Following the literature on consumption dynamics in macro data, household consumption is said to be “excessively smooth.”¹

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¹ If income is non-stationary and income growth exhibits positive serial correlation—as supported by aggregate data—the Permanent Income Hypothesis (PIH) predicts that consumption should change by an amount greater than the value of the current income shock. Consequently, consumption growth should be more volatile than income growth. Consumption growth in aggregate data, however, is much less volatile than income growth. Therefore

This paper makes two contributions to the literature on excess smoothness, one empirical and another theoretical, taking into consideration a novel feature of correlation between permanent and transitory shocks to household income.^{2,3} Theoretically, I show that the sensitivity of consumption growth to current income growth is smaller the more negative is the correlation between the shocks. Negative correlation between the shocks, therefore, may provide some scope for explanation of excess smoothness of consumption. Consumption smoothness observed in the data is intimately linked to the extent to which households are able to insure against permanent and transitory shocks. [Blundell et al. \(2008\)](#) (BPP) proposed a methodology for measuring consumption insurance in the data, while [Kaplan and Violante \(2010\)](#) focused on identification of consumption insurance against uncorrelated permanent and transitory shocks within a life-cycle model with self-insurance using that methodology. I show that the BPP-estimates of the insurance coefficients for transitory and permanent shocks are upward-biased if the shocks are negatively correlated, and downward-biased if the shocks are positively correlated. The bias for the estimated insurance of permanent shocks is, however, likely to be small in the data.

Empirically, I examine excess smoothness of consumption in the standard life-cycle model with self-insurance calibrated to US data, allowing for correlation between permanent and transitory shocks to household income. The calibrations target the same value of the average wealth-to-income ratio in the simulated economies, and the same amount of household income risk measured by the variance of household income growth estimated using data from the Panel Study of Income Dynamics (PSID). I also estimate consumption smoothness moments using data from the Consumer Expenditure Survey (CEX) and the PSID.⁴ In the model with uncorrelated permanent and transitory income shocks, I find, similar to the literature, that household consumption in the US is excessively smooth, that is, the model predicts that households should be more sensitive to income shocks than what is found in the data. While the model with negatively correlated permanent and transitory income shocks fits well the reaction of consumption to current income shocks, it still falls short of explaining the MPC out of shocks cumulated over longer horizons; that is, consumption is still excessively smooth in the data. The key to successful fitting of consumption sensitivity to current income shocks is that a negative (and positive) permanent shock is partially smoothed, contemporaneously, by a transitory shock of the opposite sign. However, because this smoothing is short-lived while the permanent shock does not die out, this mechanism is not enough to explain the sensitivity of consumption to the shocks cumulated over a longer horizon—a certain degree of partial smoothing of permanent shocks over longer spans is still needed to fit the consumption smoothness moments. [Deaton \(1992\)](#), in a summary of the literature on consumption volatility in aggregate data, defines excess smoothness as an insufficient responsiveness of consumption to the *current* income shock. The model with negatively correlated shocks is, therefore, capable of explaining excess smoothness in household data as defined in [Deaton \(1992\)](#) but the results in this paper highlight that excess smoothness should be evaluated—in macro and household data—not only against the adjustment of consumption to current income shocks, but also to the shocks cumulated over longer horizons.

While evidence on the negative correlation between the shocks is indirect because the shocks are not observed—in helping fit the consumption smoothness moments in US data better—in rare circumstances, indirect inference is not needed if the estimates of permanent and transitory shocks are available.⁵ Survey data on expected and realized incomes may allow us to point-identify permanent and transitory shocks, which makes identification of the correlation between the shocks straightforward. Unfortunately, such data do not exist in US household surveys but are available from the Survey of Italian Households' Income and Wealth (SHIW), widely used in the literature on household choices such as consumption and savings.⁶ Using data from the SHIW, I estimate permanent and transitory shocks to individual incomes and find that they are negatively correlated, with the correlation coefficient of about -0.50 .

There are a number of mechanisms that may lead to a correlation between the shocks. Idiosyncratic income changes result from a variety of events—among them many are unobservable in the available datasets—which may not necessarily fit into the rigid categories of independent permanent or transitory shocks.⁷ For instance, displacement typically involves a period of unemployment and is also thought to contain an element of the permanent income change due to loss of the firm-specific human capital.⁸ On the impact, however, the income change at the time of displacement may not necessarily equal

(footnote continued)

consumption growth is said to be “excessively smooth” relative to income growth. See, e.g., [Deaton \(1992\)](#) and [Ludvigson and Michaelides \(2001\)](#) for a more recent account.

² [Friedman \(1963\)](#), in an attempt to clarify the controversial points in his book on the consumption function, pointed out that the correlation between permanent and transitory shocks may be of any sign and, if present, should be allowed for in analysis of the consumption function.

³ See also [Browning and Ejrnæs \(2013b\)](#) for a detailed analysis of the permanent-transitory decomposition of earnings when the shocks are correlated. [Browning and Ejrnæs \(2013a, p. 224\)](#) note that “Universally in the earnings literature, it is assumed that the shocks ...are uncorrelated; this is a difficult assumption to maintain.”

⁴ Specifically, I measure consumption smoothness moments with the sensitivity of consumption to current income growth, and income growth cumulated over 4 years. The use of 4-year growth rates allows me to explore the reaction of consumption growth to income shocks cumulated over a longer horizon, when permanent shocks become relatively more important. More information on this choice is provided in [Footnotes 14 and 26](#), and related discussion in the text.

⁵ Note, however, that this is true of any indirect-inference type estimation (or calibration) that aims at recovering parameters which are not directly observed, such as the time discount factor and the coefficient of relative risk aversion in [Gourinchas and Parker \(2002\)](#), or the variance of heterogeneous income profiles in [Güvenen and Smith \(2013\)](#).

⁶ See, e.g., [Guiso et al. \(2002\)](#), [Jappelli and Pistaferri \(2011\)](#), and [Kaufmann and Pistaferri \(2009\)](#).

⁷ The same comment applies to persistent shocks.

⁸ See [Jacobson et al. \(1993\)](#) and [Kletzer \(1998\)](#).

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